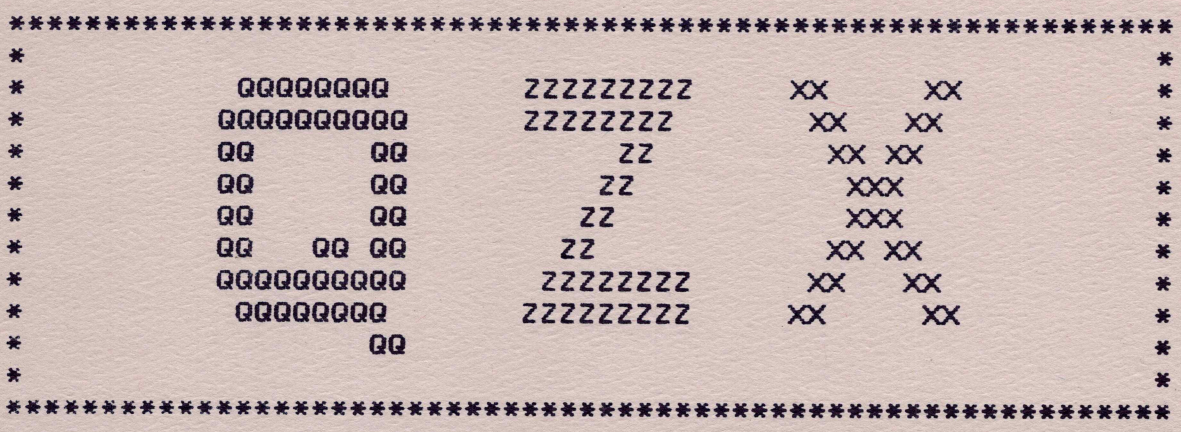


The Journal Covering Amateur Radio & Sinclair Computers
ZX-80; Micro-Ace; ZX81; T/S 1000, 1500, & 2068
2025 O'Donnell Drive
Las Cruces, New Mexico
88001

K5XY — *Alex. F. Burr* — *Publisher*

W4GHV-5 — *Bo Barry* — *Editor*

Volume 4 Number 4 *($1.50 issue)* *March 1986*

* *Putting the Timex/Sinclair on Packet Radio, Part II, W4GHV*
* *Serial Interface Project for the ZX81/TS1000, Part II*
* *Publisher's Notes, K5XY*
* *Corrections to LU8MAD TS-1000 Console*
* *Enhancements/Modifications to the RS-232 Interface, VE1HO*
* *QZX Friends*
* *Equipment Sources for your Timex/Sinclair*
* *Unclassified Ads*

Putting the Timex on Packet Radio
Part II
Bo Barry, W4GHV

Ouch! Not only did I not obtain a copy of the second part of Vic Rice's article; after spending two evenings coming up with the info on my own, typing it into my 'fabulous' portable Model 100, the 100 decided to go 'legs up' before I had saved my effort to paper, disk, etc! I don't know if I can be 'creative' twice in one month, but I'll give it a try.

Hopefully the packet 'converts' we gathered last month are still putting together their TNC-2, digging up parts for the RS-232 interface described last month, and aren't quite ready for the finishing touches to the project! Personally, I have been successful in getting my TNC-2 going with the Model 100, and am fascinated with this new mode of communication. I dug out the previously built RS-232 interface and my TS-1500 and have started to experiment with them.

As for the sketch for conversion of a modem to a RS-232 interface in last month's issue, I see Zebra Systems has a cheap modification for the WC2050 modem already available. According to their ad, it requires 3 trace cuts and a jumper, costs $19.95 ($5.95 bare board), and is easy to install. It does not say if the modem's function as a modem is hampered. See their address in the equipment source list in this issue.

A Serial Interface Project
for the ZX-81 & TS/1000
Part II
(based upon Vic Rice's article from SYNC Magazine-Nov '82)

A few additions to the schematic published last month. The first interface line (top left) goes to the system clock, the next one goes to +9 volts, and the third goes to ground. Actual pin numbers to the Timex/Sinclair will be provided in next month's issue.

To utilize the RS-232 interface with a packet controller, we need a simple 'terminal program'. The one presented this month is only a START. In fact it hasn't been tested yet! There is lots of room for improvements like split screen transmit & receive, transmission of 'canned messages', etc.. Hopefully the experts will come to our rescue. If not, Alex & I will develop the program. Our simple term program does two things- it receives and it transmits. A few words about these steps.

Receiving data

1) First we initialize the UART's control port to the receive mode

2) Next we check the Status Read flags for RXRDY, which tells us a character has been received.

3) When a character is received, move it from the data port to the computer's memory.

4) Loop thru steps 2) & 3) until a carriage return (end of line) is received.

5) Translate the received ASCII characters to the Sinclair character set and display the result.

6) The TNC sends data to the RS-232 in packets (usually a line of text) as long as the RS-232 DTR line is high.

Transmitting data

1) First we initialize the UART's control port to the transmit mode

2) Input a character from the Sinclair keyboard

3) Translate the character to ASCII

4) Check the Status Read flags for TXMT, which indicates the UART is ready to transmit a character.

5) When the UART is ready, POKE the translated character into the UART data port.

6) Loop thru steps 2) - 5) until a carriage return is sent.

7) The TNC does not transmit the typed characters as we type them, but sends them out in a packet. You can take two minutes thinking/typing a sentence, and the TNC only keys your transmitter for a few milliseconds to send the packet when you finally get around to hitting a carriage return. Would you believe about 10 or so people can share a SINGLE frequency, at the SAME time! If your packet collides with someone else's, the TNC is smart enough to send it again. A bit different from RTTY, you say?

Here's our first cut at a term program, with a discussion following it, describing the programming of the UART.

```
10 LET C = 8192
20 LET D = 8193
30 LET M = 123
40 POKE C, 64
50 POKE C, M
60 POKE C, 22
70 LET X$ =""
80 IF PEEK C = 133 THEN GOTO 80
90 LET X$ = X$+CHR$ (PEEK D)
100 IF PEEK D = 13 THEN GOTO 120
110 GOTO 80
120 FOR P = 1 TO LEN X$
130 LET Y = CODE (X$(P TO P))
140 LET Y = Y -27
150 IF Y <31 THEN LET Y = Y+ 7
160 IF Y <28 THEN LET Y = 0
170 PRINT CHR$ Y;
180 NEXT P
190 PRINT
200 INPUT X$
210 CLS
220 POKE C, 64
230 POKE C, M
240 POKE C, 49
250 FOR Q = 1 TO LEN X$
260 LET Y$ = X$(Q TO Q)
270 LET Y = CODE Y$
280 IF Y$<"A" THEN LET Y = Y+ 20
290 IF Y$>"9" THEN LET Y = Y+ 27
300 IF Y$=" " THEN LET Y = 32
310 IF PEEK C<> 133 THEN GOTO 310
320 POKE D,Y
330 NEXT Q
340 IF PEEK C<> 133 THEN GOTO 340
350 POKE D, 13
360 GOTO 40
```

Looking at some of the line numbers above:

The variables C and D refer to the UART's CONTROL and DATA port addresses. They are fixed, determined by the hardware configuration.

The variable M is for the mode setting. A complete description of programming the UART is NOT going to be given. The purpose of this interface is to communicate at 300 baud with a TNC-2. For M = 123 as in line 30, this sets the UART up for 1 stop bit, even parity, parity checking enabled, 7 data bits/character, and a baud rate of 300. To alter this setup, we alter the 123 value by subtracting 32 for odd parity, subtracting 16 to disable parity, subtracting 1 for 1200 baud (good luck running the Sinclair at this rate), or we add 4 if 8 data bits/character is desired.

Poking a 64 to the control port (line 40) resets the UART.

Poking a 22 to the control port (line 60) sets the UART up to receive, asserting DTR (Data Terminal Ready), so the TNC-2 will send some characters. Poking a 49 (line 240) will set up the transmit mode.

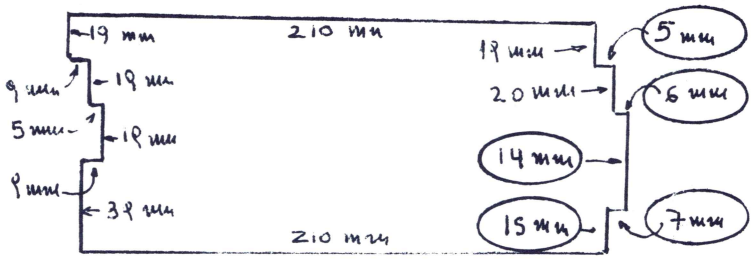
In line 80, we loop looking for a 133, which indicates DSR -Data Set Ready (TNC-2 is ready), TXMT transmitter is empty -the buffer is ready to send another character, and RXRDY- receive buffer is ready to receive another character. If all this occurs, we read in a character. At 300 baud, each received character takes about 35 milliseconds, but we still don't have enough time to convert it and display. So we wait until one complete line is received and then convert and display. The TNC-2 has a 2K RAM buffer, so it doesn't lose any of the incoming characters (from the VHF channel).

*To test things out, jumper pins 2 & 3 of the RS-232 connector, and jumper pins 5 & 6. Then when you type characters, they should be displayed. If characters are lost when connected to the TNC, we may have to add a line just prior to line 120 which will drop DTR to tell the TNC we are temporarily busy. Since our Sinclair does not have a Control key, we will need to re-program the TNC to accept something that is on our keyboard. I'm not quite sure how to do this. We could find out the ASCII equivalent of the ** key, for example, on the Sinclair and issue the following to the TNC: COMMAND n where n is the decimal ASCII equivalent of the ** key.*

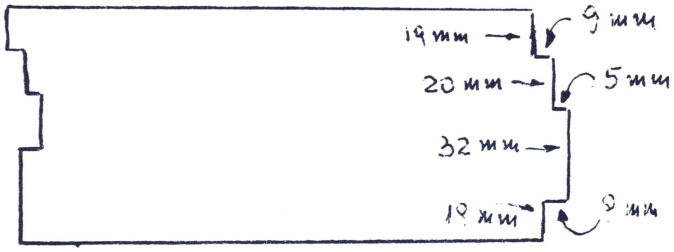
See you next month.

Corrections to LU8MAD's TS-1000 console plans:

Quite a few of you requested reprints of Guillermo's plans, and lo and behold, he had made some mistakes in them! Here are the correct dimensions for the keyboard cut-out. I see the TI 99/4 keyboards still advertised, so I assume not all Timex/Sinclairs have been converted to this bigger keyboard (yet)!

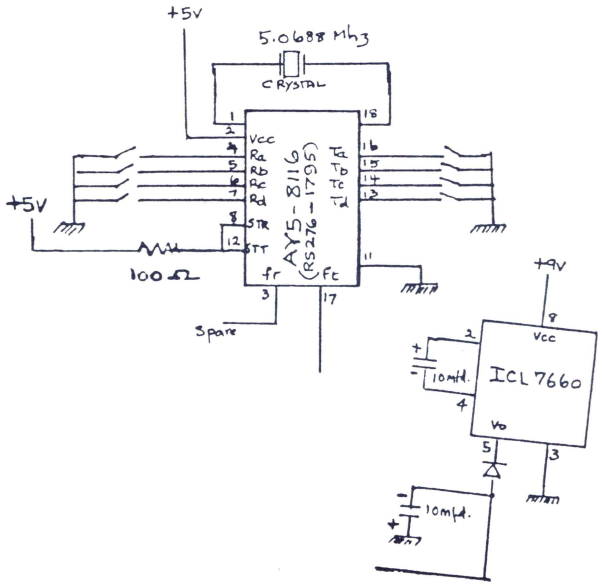


The correct dimensions are:



Variations/Enhancements to RS-232 Interface, by VE1HO

A nice letter was received from Dennis Sladen, VE1HO with a few suggestions for the RS-232 project. One involves using a dedicated baud rate generator, and another mod eliminates the need for a -9 volt supply. (I use a 9 volt transistor battery taped to the RS-232 board!) Following are schematics for these two mods, the Radio Shack part number is included for the baud rate generator, and the ICL 7660 can be obtained from Jameco Electronics, I believe. The ICL 7660 should not see more than +10volts input, by the way. The frequency output of the baud rate generator (pin 17) should be 4800 Hz for a baud rate of 300.



PUBLISHER'S NOTES

Packet continues apace. Both Bo and I have TNC's built and working but not yet connected to any of our Sinclair computers. Packet is a little slower than I expected but is lots of fun. It combines the advantages of telephone style BBS with easy RTTY style operating. One really has to buy a TNC (terminal node controller. Get the Tucson type 2 version). It is possible to get the computer to do all the things that a TNC does with software but the program would have to be written in machine language, would require a very good knowlege of the approriate protocol which is only available in a long hard to read document. The TNC provides for all sorts of automatic operation including logging of channel activity, repeater operation, ID, beacon operation, and much more. If you wait for somebody to write such a program for a Sinclair computer, you will grow old first. The big disadvantage is that these TNC's do cost money. From $150 to $220 up. You can save about $50 by getting a kit, but you will spend quite a few hours building it. (You save about the minimum wage unless you are a much faster kit builder than I am.) Do not buy the kit which contains only the hard-to-get parts unless you have access to a larger parts stock than 99% of other hams.

You are going to need an RS232 interface to use the TNC. There are

several ways of getting the interface. See the last issue and this issue of QZX. Also see the ad for the COMLINK in this issue of QZX. Modem boards come as low as $10 and the last issue of QZX had some ideas on how to use them with a TNC. Zebra systems sells a kit to go with their modem board for a total of $30.

Somebody wrote to complain that they did not like the cutout coupons in QZX because they left holes. Others just make copies of that page. If a copy machine is not available, just hand copy the requested information. When renewing, you do not have to cut out your mail address; but it does help me a lot if you would at least put the top line of the label on you renewal check or in the accompaning letter, if any.

QZX FRIENDS

VE2LI -- George now has three computers, a ZX81, a T/S 2068, and a Commodore 64. He recently renewed and stated that he had to pay Canadian $17 for the US $12 money order to do so.

WA0ZTU -- Rolf is a new subscriber with a ZX81 and 64K RAM. He has an external keyboard with homebrew circuits for 10 dedicated auto-shift keys, a repeat key, and a shift lock function.

NR5A -- Jerry was one of a surprising numbers who asked for the detailed plans for the mechanical work necessary to add a TI keyboard. he also indicated his intention to put his T/S 1000 on cw and RTTY.

W9JEX -- Andrew said he has three ZX81 - T/S 1000 with a 64K memory from Memotech. He would like more programs for these computers. He says that he does not intend to purchase a more sophisticated computer soon, since he has much to learn for his ZX-81.

KD6TO -- Dave says the only thing his Sinclair lacks is packet radio.

KA4FRF -- Tom writes from Karachi that he enjoyed the Tom Woods article on interrupts. There is not too much written about their use that he has been able to find. He has some interrupt driven trace and clock programs that work on the 2068 with a little fix-up of the ROM calls. He says that the Russell ROMFIX was probably the cheapest fix that he has purchased that did so much: Trace, Clocks, and Sprites plus an "interrupt manager" that will run more than one interrupt driven routine.

N9BBN -- John wrote, "Sorry I'm late (with renewal). Please make sure I get the March 86 issue - I really want to get my T/S 1000 on packet!

K6BPT --Skip said he saw a notice about the QZX FIDO BBS on packet via KD6SQ. He also says he uses his ZX81 and T/S 1000 for ham programs. He used to write commercial financial programs. He did not do ham programs because KA2LHO was doing such a great job.

WD0DCU -- Anthony says he has no intention to switch to the QL. He is having too much fun with the T/S 1000 and 2068.

Edward Radtke visited us in person this month. He told us of his efforts to keep his users group in Louisville, Ky active. He also told us about his collection of Sinclair products including a watch kit. See his unclassified ad in this issue as he attempts to complete his computer collection.

EQUIPMENT SPECIALS

This is a new monthly column in which we will list some of the equipment in which we think our readers will be especially interested or which appear to be special bargains. If you have suggestions for items to appear here send them in. If you have comments on the items which appear here send them in too. The information here is as accurate and as complete as we can make it, but is listed here only as an indication as to what might be available. Any decision to purchase should only be made after further investigation.

ITEM	COMMENTS	$	ID
ZX81	Computer only	$20	HT
ZX81	AS-IS some need work	$10	ZS
WC2050	untested modem board	$10	ZS
RS232	conversion kit for above	$20	ZS
RS232	conversion (bare board)	$ 6	ZS
WC2050	complete warranted	$70	ZS
MTERM II	for T/S 2068	$30	ZS
	advanced terminal software		EB
Above	in cartridge form	$35	ZS
The Complete Guide to MTERM II		$ 7	BC

Booklet on MTERM II		
T/S 2068 extra software inc	*$99*	*SE*
T/S 1500 complete	*$50*	*SE*
CWSS cw program and interface	*$25*	*LHO*
RTTY program and interface	*$35*	*LHO*
QZX Index	*FREE*	*LHO*
QL extra software included	*$299*	*CU*
Spectrum accessories		*EC*
Sinclair Computerfest		*MW*
Keyboard kit for ZX81 etc	*$15*	*EB*
Computer Repair	*varies*	*SE*

ID Addresses

HT Hal-Tronix, Inc.
Box 1101 Dept QZX
Southgate, MI 48195
(313) 285-1782

ZS Zebra Systems
78-06 Jamaica Ave. Dept QZX
Woodhaven, NY 11421
(718) 296-2385

SE Sunset Electronics
2254 Taraval Street Dept QZX
San Francisco, CA 94116
(415) 665-8330

MW Midwest T/S Computerfest
3832 Watterson Ave. Dept QZX
Cincinnati, OH 45227

EB E. Arthur Brown Co.
3404 Pawnee Drive Dept QZX
Alexandria, MN 56308
(612) 762-8847

EC English Micro Connection
15 Kilburn Court Dept QZX
Newport, RI 02840
(401) 849-3805

CU Curry Computer
Box 5607 Dept QZX
Glendale, AZ 85312-2902
(602) 978-2902

LHO Kraig D. Pritts - KA2LHO
3421 Oneida St. Dept QZX
Chadwicks, NY 13319

BC Barry Carter
Box 614 Dept QZX
Warren, MI 48090

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

FOR SALE: Timex 1500 $20, TS 2050 Modem $40, AD1B, 54 Hermaine Ave., Dedham, MA 02026.

FOR SALE: Virtually unused: Times 2068 computer, 2040 printer, 2050 modem. Programs; Vu-3D. Vu-File, Vu-Cal, SmartCom II, others; books and 28 issues of QZX. $200 or offer. Sam Geise KE3Y, RD2 Box 48 -b, Sunbury, PA 17801.

COMPUTERFEST: Timex-Sinclair Computerfest May 3rd and 4th at Sharonville Ramada Inn, I-75, Cincinnati, OH. 9AM - 5PM. Send SASE: Midwest Timex- Sinclair Computerfest, 3832 Watterson St., Cincinnati, Ohio 45227. This will be a big event, the whole nation and a few from outside the U.S.A. See the disc drives, tape drives, peripherals and software you've been reading or hearing about. Meet some of the best hackers, programmers and magazine writers around. Tickets available at the door or send for advance tickets $5.00 for both days. Dealers and venders send to find out how you can have a booth at this TIMEX-SINCLAIR COMPUTERFEST!

WANTED: J K Audio interface and MICRO-ACE Computer. Edward L. Radtke, 1602 Woodluck Ave., Louisville, KY 40205 (502) 458-7324.

FOR SALE: (Postpaid on receipt your check.) ZX printer and 3 rolls paper $40. Mint CW-1 I/O and CWSS program, $35. Hot - Z disassembler, 32K + version, $20. Complete Syntax newsletter to Mar. 83 in binder. $15. Various books on ZX-81/TS-1000 applications, M/L, I/O, etc. S.A.S.E. for titles. Jon Harder, K1US, Box 32, APO New York, 09029.

COMLINK I will link your ZX81 or TS1000 to the outside world. With this easy to use adapter and any 300 baud modem you can:

* Access databases such as Compuserve, The Source, or Dow Jones News/Retrieval.

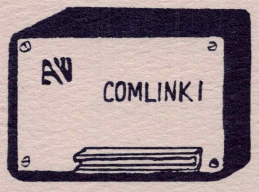
* Use your school or company mainframe computer from home.

* Use with a Terminal Node Controller (TNC) for packet radio.

* Print information received using the TS printer.

All software is included in EPROM so there is nothing to load before using COMLINK I. All operating power is supplied by the Sinclair. Simply plug the unit into your Sinclair and connect it to an RS-232C compatible modem or TNC. One 'USR' call gets you started!

Each unit is attractively cased, fully tested, and is sent with complete operating instructions. Only $54.95 includes shipping.



To order, send check or money order to:

A. Eckhardt
918 Anna Street
Boalsburg, PA. 16827

32K BANKED MEMORY

Plugs into the TS2068 cartridge slot. This 32K ram is much more than just a memory. An on board battery keeps it alive even when you turn the computer off. Switch selectable for use in the DOCK or EXROM banks with NO mods to the computer. Write protect switch lets you use memory like an EPROM. Run your own plug-in BASIC programs! Extend capacity by 32K. Reduce or eliminate tape loading time. Detailed instructions include utilities for bank switching and data transfers. The perfect tool for extending your 2068's memory or for writing and debugging EPROM software. A beautiful board: solder masked, gold tipped, satellite grade anti-static coating. Very dependable and rugged. Battery included. Only $109.95

EXTENDED BASIC

22 new commands for your TS1000! Advanced screen utilities make your ZX81 look more like a monochrome 2068. Includes READ, DATA, RESTORE, FILL MOVE, LEFT$, MID$, RIGHT$. IN and OUT commands give you Basic control of I/O mapped peripherals which were previously accessed only in machine code. Extended Basic does not require the use of PEEK, POKE, or USR. Takes up just 3.5K of memory. 24 page manual, sample listings included. Unbelievable speed, excellent documentation. NO USR CALLS!! Only $19.95

WATOR • ZX81!

Now the ZX81/TS1000/1500 has its very own (and very excellent) version of this popular ECOLOGY SIMULATION program; the idea of which first appeared in Oct. '84 Scientific American. WATOR recreates the ecology of 3 interdependent species. You can experiment by changing populations, feed cycles, reproduction, etc. Watch generations pass on the TV screen. Generate HI-RES population curves on the TS2040 printer. Very useful for studying predator/prey relationships. On cassette: Just $16.95

UNIVERSAL I/O PORT

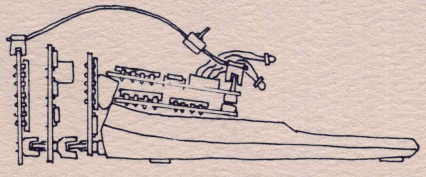
The ideal peripheral for experimentors. Learn to control and sense external devices using your computer. Works with ALL Sinclair/Timex machines. 8 bits parallel input, 8 bits latched output plus 2 handshake lines. Easy to set up or reconfigure many times. This board forms the foundation of a series of software applications which teach concepts of port programming. Choose one application listed below ABSOLUTELY FREE when you order a port board. Only $69.95 each or 2 boards for $109.95

APPLICATIONS AVAILABLE NOW!!

*Morse Code Translator for TS2068--Accepts tone decoder input, outputs ENGLISH on the TV screen or printer. Full screen display, auto scrolling. 5K buffer. Unique built-in signal reader aids in detecting/reducing noise from the system. This program is a great tool for learning morse code. Instructions cover set-up, tips for noise reduction, and a detailed tutorial on CW translation theory. Regularly: $16.95

*Pseudoscope for TS2068--A serial bit stream analyzer which mimics the action of an oscilloscope. Use to graphically portray low frequency digital signals in a horizontally scrolling graph. Program lets you store and compare samples. Print them out on a 2040 printer. Adjustable sample rate, 60hz timing dots are plotted with your input sample. Pseudoscope lets you SEE morse, rtty, serial keyboard signals, etc. as the computer sees them. Very useful in program development or in optimizing interface hardware. Tape/instruction book/full disassembly: $16.95

*Computer I/O Data Communications--Lets your 2068 speak to your ZX81! Use your TS1000 (must have 64K ram) to store data for your 2068. Send commands which transfer data back and forth, or cause the TS1000 to execute your own special Basic commands. Now 2068 owners can put their old 1000's back on line. Software includes operating systems for both computers. Requires 2 port boards (one for each computer). Tape/instructions: $16.95.



Please add $1.50 per order for postage. Phone orders are gratefully accepted.
To order, send check, money order, or credit card information to:

Thomas B. Woods
P.O. Box 64, Jefferson, NH 03583
Phone (603) 586-7734

****
Software & Hardware for
TIMEX-SINCLAIR
****

73, W4GHV & K5XY

QZX presents the best software & hardware projects available for the radio amateur. While the contents are believed to be accurate, no warranty is extended on any program or project. No investigation has been made of the claims or reputation of any advertiser. It would be greatly appreciated if all correspondence requiring an answer would be accompanied by a self-addressed stamped envelope (SASE). *Copyright by QZX 1986. All rights reserved, photocopying by permission only.*

****

Please send me QZX for 1 year, starting immediately. Enclosed is $12.00 for twelve issues. (Those with addresses not in Canada, the US, or Mexico send $25.00 in US funds for air mail delivery.. Thanks (03/86)

Name _____

Call _____

Address _____

City _____

State _____ *ZIP* _____

****

QZX Journal
2025 O'Donnell Drive
Las Cruces, N.M.
88001

BULK RATE
U.S. POSTAGE
PAID
LAS CRUCES, N.M.
PERMIT NO. 655

W*9MAT 86/09
KEN MATZNER
RR 5 BOX 15
CHARLESTON, IL 61920